Session X. Airborne Doppler Radar / Industry

Status of Bendix Research
Daryal Kuntman, Bendix

DOPPLER WEATHER RADAR

WITH

PREDICTIVE WINDSHEAR DETECTION CAPABILITY

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OCTOBER 18, 1990

WE ARE...

A DIVISION OF ALLIED-SIGNAL AEROSPACE COMPANY WHICH IS A PART OF ALLIED-SIGNAL CORPORATION.

HAVE BEEN MANUFACTURING AIRBORNE WEATHER RADARS SINCE 1954.

HAVE THE MOST RADARS (OVER 35,000 DELIVERED) ON AIR TRANSPORT TYPE AIRCRAFT FLYING WORLDWIDE.

COMMITTED TO THE DEVELOPMENT OF AIRBORNE WEATHER RADAR WITH FORWARD LOOKING PREDICTIVE WINDSHEAR DETECTION CAPABILITY.

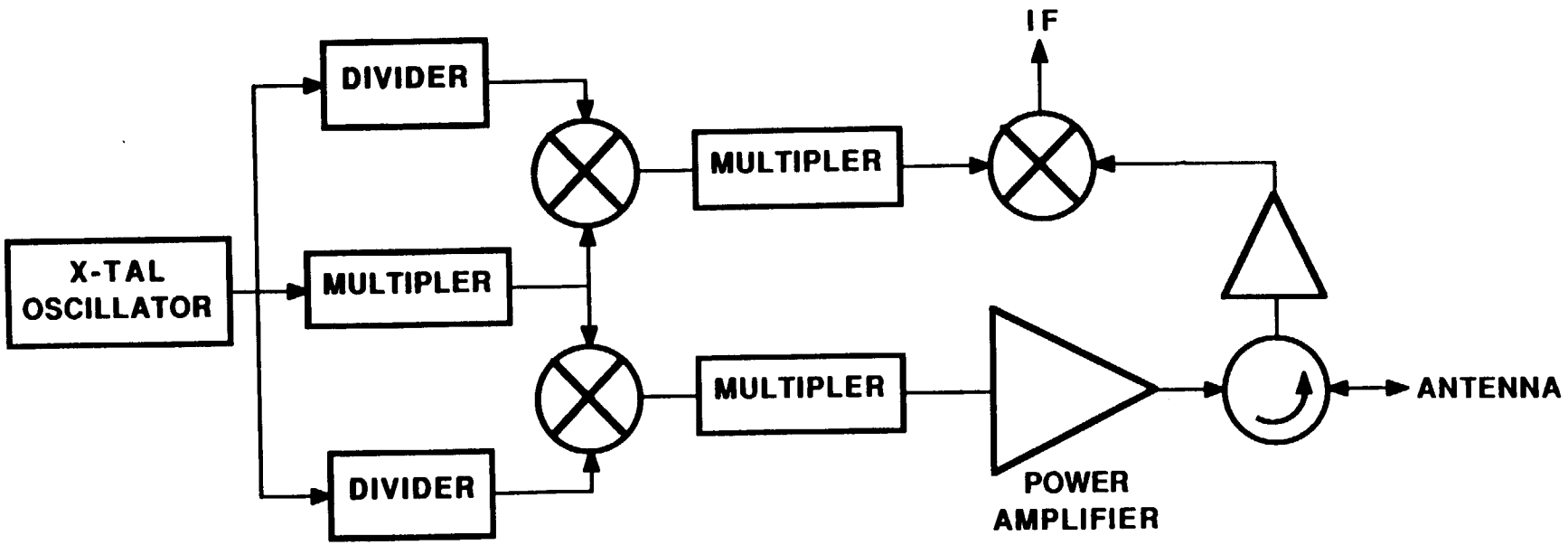
BENDIX/KING ATAD RADARS
IN CURRENT AIRLINE FLEETS

- RDR-1E: MAGNETRON TRANSMITTER NOT SUITABLE FOR WINDSHEAR DETECTION.

- RDR-1F: MAGNETRON TRANSMITTER NOT SUITABLE FOR WINDSHEAR DETECTION.

- RDR-4A: LATEST GENERATION
  SOLID-STATE TRANSMITTER
  FULLY COHERENT
  DOPPLER TURBULENCE DETECTION CAPABILITY

RDR-4A FREQUENCY GENERATION



PLAN

- TO ADD WINDSHEAR DETECTION CAPABILITY TO THE RDR-4A SYSTEM AS A MODIFICATION.

- CONDUCT FLIGHT TESTS WITH AIRLINES DURING 1991.

MODIFICATIONS

RECEIVER/TRANSMITTER:

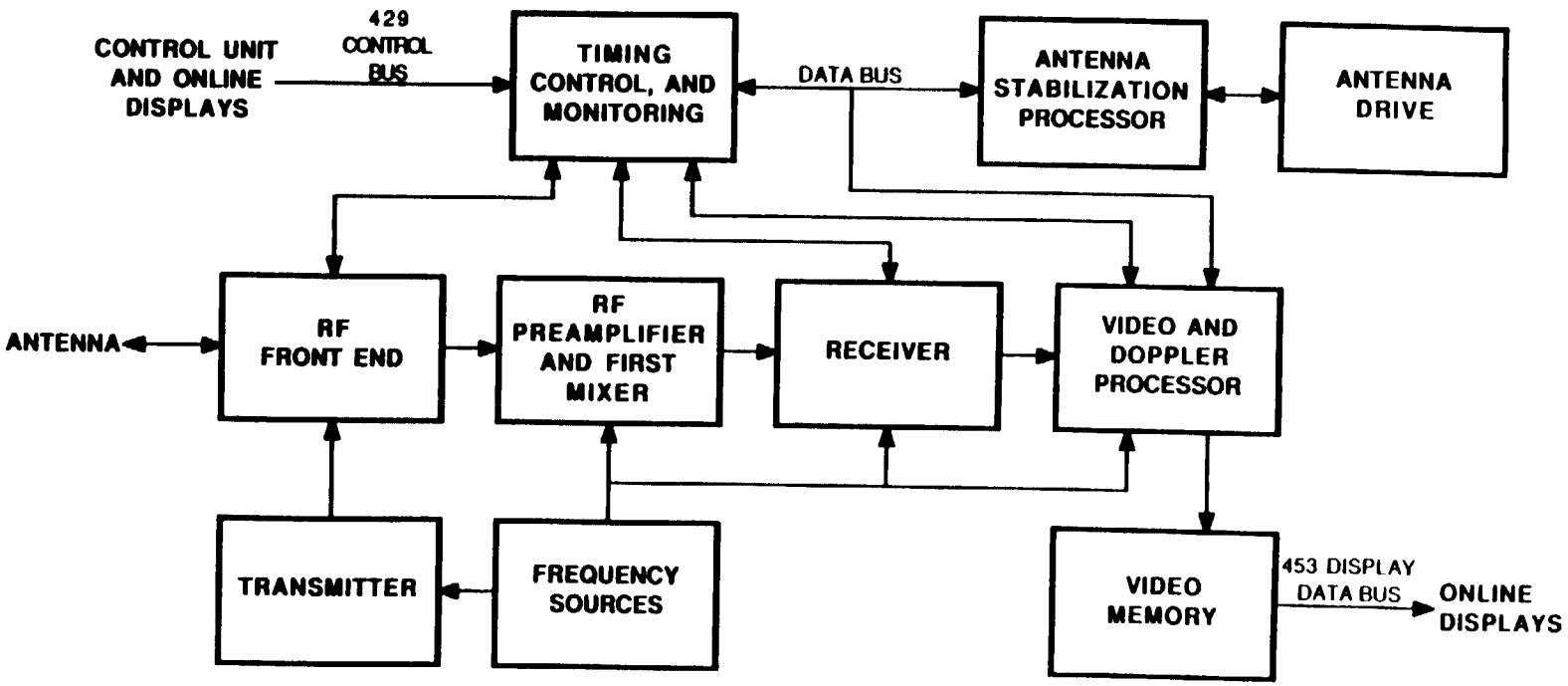
- ADD WINDSHEAR DETECTION HARDWARE AND SOFTWARE
- ADD WINDSHEAR MODE CONTROL SOFTWARE
- ADD WINDSHEAR DATA TO THE OUTPUT BUSES

CONTROL PANEL: ADD WINDSHEAR MODE SELECTION CAPABILITY

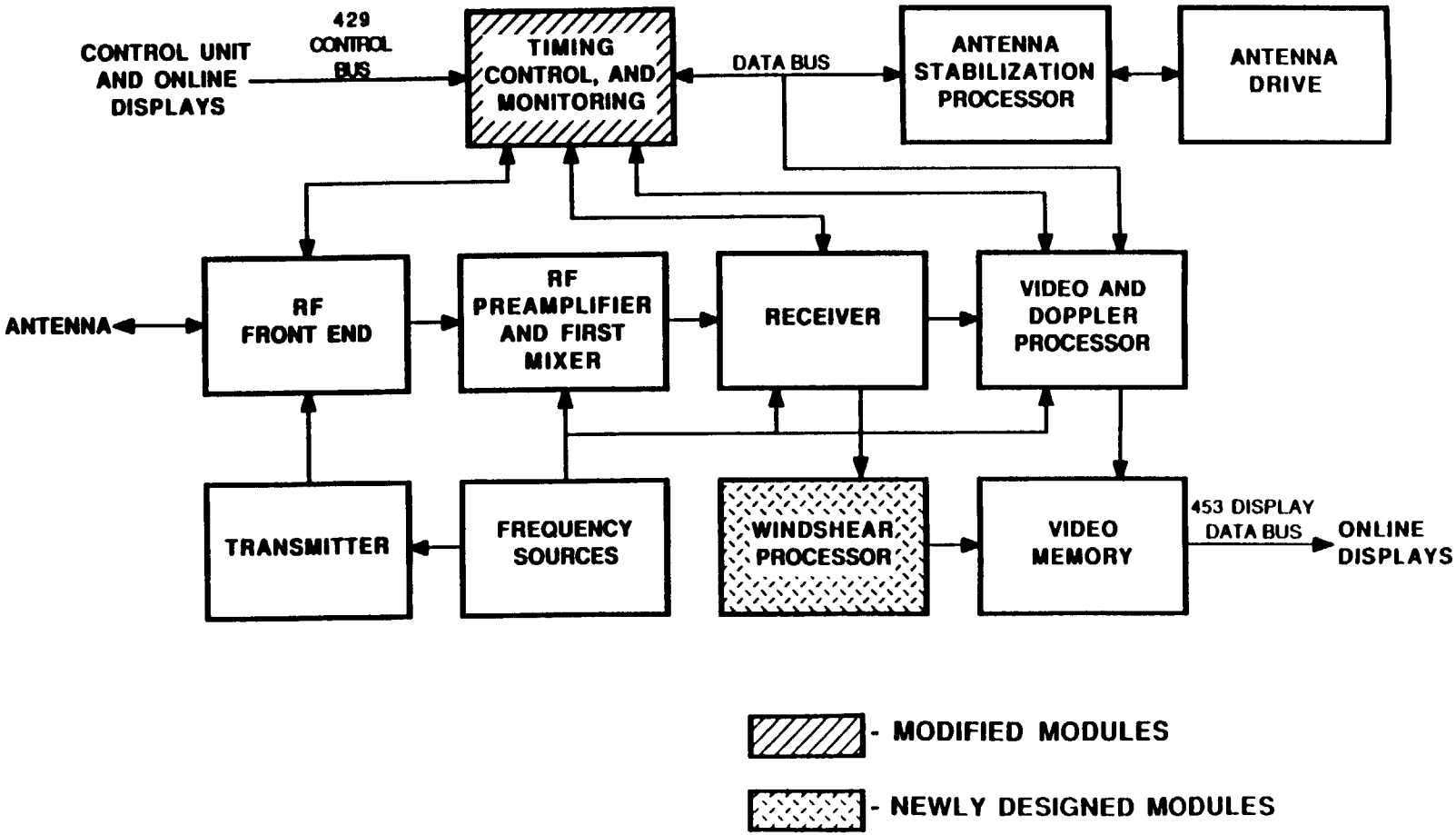
INDICATOR: ADD WINDSHEAR DATA DISPLAY CAPABILITY

ANTENNA: NO MODIFICATIONS REQUIRED

RDR-4A FUNCTIONAL BLOCK DIAGRAM



RDR-4A WITH WINDSHEAR DETECTION



RDR-4A CHARACTERISTICS

	WEATHER AND MAP MODE	TURBULENCE DETECTION	WINDSHEAR DETECTION
TRANSMITTER PEAK POWER	125 W (NOMINAL)		
PULSE WIDTH	6 AND 18μSEC ALTERNATING	6μSEC	2μSEC
PRF	380 Hz	1600 Hz	6000 Hz
MAXIMUM RANGE	320 NMILES	40 NMILES	10 NMILES
OPERATING MODE	PULSED COHERENT		
FREQUENCY	9345 ± 2 MHz		
SYSTEM NOISE FIGURE	5 DB		
ANTENNA SCAN	180°		40°
ANTENNA GAIN	35 DB		
ANTENNA BEAMWIDTH	3.3° ELEVATION 3.4° AZIMUTH		
TILT CONTROL	± 15° MANUAL		AUTOMATIC

ISSUES

TECHNICAL:

- GROUND CLUTTER ELIMINATION
- ESTABLISHMENT OF HAZARD THRESHOLDS
- DEFINITION OF DISPLAY DATA BUS CHARACTERISTICS
- SPECIFYING DATA INPUT REQUIREMENTS
- DEFINITION OF FORM/FIT/FUNCTIONAL REQUIREMENTS (ARINC)

OPERATIONAL:

- MEANS OF SELECTING WINDSHEAR MODE
- DISPLAY MEANS
- AURAL ALERTS
- INTERACTION WITH REACTIVE WINDSHEAR DETECTION SYSTEM

CERTIFICATION:

- ESTABLISHMENT OF A CERTIFICATION CRITERIA SIMILAR TO THE REACTIVE WINDSHEAR DETECTION SYSTEM

ESSENTIAL REQUIREMENTS FOR CERTIFICATION WITHOUT EXTENSIVE FLIGHT TESTS

- ESTABLISHMENT OF PERFORMANCE CRITERIA USING SIMULATED DATA (NASA)

- DEFINITION OF TEST MEANS USING SIMULATED SIGNAL INPUTS (NASA)

- MINIMUM OPERATIONAL REQUIREMENTS (RTCA)

- TSO (FAA)

- ADVISORY CIRCULAR FOR AIRWORTHINESS AND OPERATIONAL APPROVAL (FAA)